On the Possibility of Producing an Electron Plasma of High Concentration Using Radioactive Isotopes

the β-particle energy 1.57 Mev. Using this isotope, it is possible to obtain a plasma in any gaseous medium. Recombination on the walls of the chamber is not taken into account and, as an example, mercury vapour is considered. The recombination coefficient of mercury is $d = 2.3 \times 10^{-10} cm^{-3} sec^{-1}$ (Ref 3). In order to obtain an electron plasma with a charge density of the order of 10^{13} cm^{-3}, the number of ions formed per second per cm^3 of plasma must be 2.3×10^{16}. To reduce the dimensions of the chamber, the mercury vapour is assumed to have a density of 2.95×10^{-2} g/cm^3 and a temperature of 500°C. It is shown that, under these conditions, each electron can produce 5.3×10^4 acts of ionisation. The total activity of yttrium-91 necessary to obtain a plasma state is given by $Q = (N_o V) / (1.37 \times 10^{10} n)$ curies, where n is the number of acts of ionisation (the electrons are assumed to come to rest), N_o is the number of ions formed per second and V is the volume of the chamber. It is shown that in the case of a toroidal chamber with an internal diameter of 27 cm, the specific activity per cm^2 of the

On the Possibility of Producing an Electron Plasma of High Concentration Using Radioactive Isotopes

surface should be 214 curie/cm^2. This is independent of the volume of the chamber. The thickness of the yttrium layer required is 1.7×10^{-3}cm. This shows that it is possible to obtain a high concentration plasma (10^{13} charges/cm^3) using radioactive isotopes. There are 5 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut imeni S.M.Kirova (Ural Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: July 14, 1958

STEPANOV, V. G.

66702

24,2120

SOV/109-4-8-22/35

AUTHORS: Granovskiy, V.L., Luk'yanov, S.Yu., Spivak, G.V. and Sirotenko, I.G.

TITLE: Report on the Second All-Union Conference on Gas Electronics

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 8, pp 1339 - 1358 (USSR)

ABSTRACT: The conference was organised by the Ac.Sc.USSR, the Ministry of Higher Education and Moscow State University.

A.A. Timofeyev - "Measurement of the Gas Density During the Dynamic Operation of a Discharge" (see p 1306 of the journal).A.V. Nedospasov - The Nature of a Striated Positive Column".

V.I. Perel' and Yu.M. Kagan - "The Theory of Probes for Arbitrary Pressures".

Yu.M. Kagan et al. - "The Positive Column of a Discharge in a Diffusion Regime".

M.V. Konyukov - "Influence of the Processes of the Annihilation of the Negative Ions on Their Concentration in the Column".

M.D. Gabovich and L.L. Pasechnik - "Anomalous Scattering, Excitation of Plasma Oscillations and Plasma Resonance"

Yu.L. Klimantovich - "Energy Lost by Charged Particles for the Excitation of the Oscillations in Plasma (the Langmuir paradox)" and "The Theory of Non-linear Plasma Oscillations".

Ye.G. Martinkov and I.G. Nekrashevich - "Dependence of the Temperature in the Near-electrode Region of a Pulse Discharge on the Material of the Electrodes".

N.A. Neratina and B.N. Klyarfel'd - "Formation of Light Spots on the Anode of a Gas Discharge (see p 1301 of the journal).

N.A. Matveyeva -"Distribution of Binary Mixtures of Inert Gases in a d.c. Discharge".

V.G. Stepanov and V.F. Zakharchenko - "Some Phenomena in Rarified Plasma".

V.G. Stepanov and V.S. Bazel' - "The Possibility of Obtaining Highly Concentrated Plasmas".

G.V. Smirnitskaya and E.M. Reykhrudel' - "Some Characteristics of the Discharge in an Ion Pump and in a Magnetic Ionisation Vacuum Gauge".

Ye.P. Kucherenko and O.K. Nazarenko - "Properties of a Discharge with Electron Oscillations in a Magnetic Field" (see p 1353 of the journal).

The paper by L.M. Biberman and B.A. Veklenko considered the approximate methods for determining the concentration of atoms at the radiation levels.

I.I. Sobel'man and L.A. Vaynshteyn read a paper on "A Non-stationary Theory of the Stark Broadening of the Spectral Lines in Plasma".

M.A. Mazing and S.L. Mandel'shtam - "The Broadening and the Shift of Spectral Lines in a Gas-discharge Plasma".

D. Lamt (England) - "The Kinetics of Electron Collisions Leading to the Excitation of the Molecular Hydrogen in a Hydrogen Discharge".

V.N. Kolesnikov et al. - "Some Properties of the Arc Discharge in an Atmosphere of Inert Gases".

A.A. Mak and N.P. Yanyukov - "Production of High Temperatures By Means of Spark Discharges".

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S/058/60/000/007/002/014
A005/A001

Translation from: Referativnyy zhurnal, Fizika, 1960, No. 7, p. 37, # 16068

AUTHORS: Stepanov, V. G., Kukhtin, V. A.

TITLE: An Ionic Frequency Converter for Feeding a Betatron

PERIODICAL: Izv. Tomskogo politekhn. in-ta, 1959, Vol. 96, No. 1, pp. 119-129

TEXT: A series of circuits is proposed of ionic frequency converters for feeding a betatron, which do not comprise an inverter unit and make it possible to produce frequencies of 150, 300, 450 cps and more. The description is given and a detailed analysis is performed of two types of circuits of valve frequency converters. The first circuit makes it possible to obtain at the output one-phase voltage of tripled frequency; such a converter consists of two-three-phase controlled ionic rectifiers operating alternately with 120° electric lag angle. In the circuits of the second type, both half-periods of the transformer secondary winding are utilized. Such circuits can be applied to converters eith the frequency ratio f_2/f_1 = 3, 5, 7, 9 etc. A comparison of the frequency conversion circuits is carried out. The calculation methods of the typical transformers and

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S/058/60/000/007/002/014
A005/A001

An Ionic Frequency Converter for Feeding a Betatron

the conversion power coefficients are presented. The linear diagrams of the secondary transformer phase voltages and the voltages at the converter output are given. Results from experimental investigation are presented for a circuit built with thyratrons. The circuits proposed have lower cost, larger efficiency, higher simplicity, and reliability in comparison with circuits having an inverter unit. [Tomskiy politekhn. in-t.]

V. A. Kramchenko

Translator's note: This is the full translation of the original Russian abstract.

69445
S/139/60/000/01/019/041
E201/E491

24,2120

AUTHORS: Stepanov, V.G., Zakharchenko, V.F. and Bezel', V.S.

TITLE: Motion of a Plasma in a Moving Magnetic Field

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 1, pp 104-114 (USSR)

ABSTRACT: The authors deal with motion of a charged particle in a rotating magnetic field. It is shown that the hydrodynamic approximation can be used to study motion of ionized gas in a rotating magnetic field at field frequencies much smaller than the Larmor frequency. The theoretical results were checked experimentally on a plasma excited in a vertical glass tube of 380 mm height and 60 mm diameter. A tantalum anode was placed in the upper end of the tube, and liquid mercury at the bottom of the tube served as the cathode (Fig 1). A rotating magnetic field of 325 Oe intensity was produced by two pairs of mutually perpendicular coils with iron cores; the circuit is shown in Fig 2 and the spatial distribution of coils in Fig 3. Inside the tube, the authors placed a light four-winged quartz vane, supported

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S/139/60/000/01/019/041
E201/E491

Motion of a Plasma in a Moving Magnetic Field

vertically between a pair of agate bearings. On application of the rotating magnetic field to the plasma the vane rotated in the same direction as the applied magnetic field. This rotation occurred only above a certain critical pressure, which was 10^{-3} mm Hg in the authors' apparatus. The maximum steady-state rate of rotation was 50 rev/sec. From an approximate calculation of the forces acting on the vane, the authors deduced that the whole volume of the gas rotated, like a conducting liquid, in agreement with the theoretical predictions. There are 3 figures and 5 references, 4 of which are Soviet and 1 a translation from English into Russian.

ASSOCIATION: Ural'skiy politekhnicheskiy institut imeni S.M.Kirova
(Ural Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: January 26, 1959

Card 2/2

STEPANOV, V.G.; PULIN, D.A.

Experimental determination of the magnetic susceptibility of a plasma. Izv.vys.ucheb.zav.;fiz. no.2:239-240 '60. (MIRA 13:8)

1. Ural'skiy politekhnicheskiy institut im. S.M.Kirova.
(Plasma (Ionized gases)—Magnetic properties)

88062

S/139/60/000/006/032/032
E032/E414

24.2120 (1049, 1160, 1482)

AUTHORS [redacted] and Bezel', V.S.

TITLE Production of Striated Discharge in Mercury-Vapour by a Magnetic Field

PERIODICAL Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No.6, pp.174-176

TEXT The interaction of a magnetic field with a low-voltage arc discharge in mercury vapour was investigated. The gas discharge was excited in a glass container 60 mm in diameter. The container was provided with an oxide-coated, directly heated cathode in the form of a spiral and a plane tantalum anode. The distance between the anode and the cathode was 40 mm. The mercury vapour pressure was determined from the temperature of the liquid phase and was found to be 6×10^{-3} mm Hg. The external magnetic field was arranged to be in the direction of the axis of the tube and could be varied between 0 and 400 oersted. When the magnetic field was applied to the discharge, a striated appearance could be seen and became more pronounced with

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S/139/60/000/006/032/032
E032/E414

Production of Striated Discharge in Mercury-Vapour by a Magnetic Field

increasing magnetic field. The discharge was photographed for different values of the magnetic field. The appearance of striations confirmed Klyarfeld's suggestion (Ref. 1 and 3) that the presence of negative ions and recombination at the walls are not essential for the formation of striations. It is stated that under the conditions of the experiment now described, a rapid increase in the probability of recombination within the volume of the tube is the decisive factor. It was found that striations are formed when the pressure is such that at least 10 electron-molecule collisions occur between neighbouring striations and hence the distance between the striations depends on the pressure. This situation is described by the formula $\ell P^m = \text{const}$ where ℓ is the distance between successive striations, P is the pressure and m is a parameter which in most cases is less than unity. It was found experimentally by the present authors that the distance between the striations decreases as the magnetic field is increased. This is explained

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BIL'DYUKEVICH, A.L.; VINOKUROV, V.M.; ZARIPOV, M.M.; POL'SKIY, Yu.Ye.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Electron paramagnetic resonance in andalusite. Zhur. eksp. i teor. fiz. 39 no. 6:1548-1551 D '60. (MIRA 14:1)

1. Kazanskiy gosudarstvennyy universitet.
(Paramagentic resonance and relaxation)
(Andalusite)

VINOKUROV, V.M.; ZARIPOV, M.M.; STEPANOV, V.G.

Paramagnetic resonance of Mn^{2+} in dolomite and magnesite. Zhur. eksp. i teor. fiz. 39 no. 6:1552-1153 D '60. (MIRA 14:1)

1. Kazanskiy gosudarstvennyy universitet.
(Paramagnetic resonance and relaxation)
(Manganese) (Dolomite) (Magnesite)

27299

S/181/61/003/008/029/034
B111/B102

24.7900

AUTHORS: Vinokurov, V. M., Zaripov, M. M., Stepanov, V. G., Pol'skiy, Yu. Ye., Chirkin, G. K., and Shekun, L. Ya.

TITLE: Electron paramagnetic resonance in natural chrysoberyl

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2475 - 2479

TEXT: The electron paramagnetic resonance spectrum of the Fe^{3+} ions which substituted isomorphically the Al^{3+} ions in Al_2BeO_4 was investigated. Measurements were made of triple, double, and single crystals at room temperature, at, $(7 - 51)\cdot10^9$ cps, and in magnetic fields of up to 20 kilogauss. Nuclear resonance of hydrogen, deuterium, and lithium was used to measure the field strength. The single crystals were placed in a cylindrical H_{111} resonator, and their natural faces (100) on its bottom. $\vec{H}$ could be changed by an angle of 360° in that plane. For studying the angular dependence of the e.p.r. spectrum between $10\cdot10^9$ and $20\cdot10^9$ cps a E_{011}

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Electron paramagnetic resonance...

resonator was used. The crystal in it could rotate around an axis perpendicular to the resonator's axis. The magnet rotated together with it by 360°. The measurements showed that the angular dependence of the e.p.r. spectrum was due to paramagnetic atoms substituting the Al^{3+} ions. The direction c was found to be one of the main directions of the electric field in the crystal acting on the paramagnetic ion. Whilst the existence of four magnetically nonequivalent, pairwise identical complexes was expected from X-ray diffraction studies, investigations of the e.p.r. spectra indicated the existence of only two identical complexes oriented in opposite directions. The orientations of the other two include an angle of about 70°. The authors attempt to explain this divergence by the assumption that the Al^{3+} ions are replaced by Fe^{3+} only in those complexes (II and IV in Fig. 1) in which the Al^{3+} ions are arranged symmetrically around the O^{2-} ions. If one considers only the neighborhood of the substituting Fe^{3+} ions, they seem to be subjected to an almost cubically symmetric electric field. It is, however, shown that the spectrum observed can be described by a Hamiltonian of lower (rhombical) symmetry. This fact is explained by the assumption that the atoms farther

Electron paramagnetic resonance...

from the Fe^{3+} ions which are arranged in rhombical symmetry have a significant influence upon the crystal field. Only in a few cases Al^{3+} ions in octahedral sites (I and III, Fig. 1) are substituted by Fe^{3+} ions. V. D. Kolomenskiy and V. G. Kuznetsov are thanked for having supplied specimens, D. Kh. Dinmukhametov and R. M. Mineyev for their assistance in calculations, and S. A. Al'tshuler for discussions. There are 3 figures and 4 references: 1 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova-Lenina (Kazan' State University imeni V. I. Ul'yanov-Lenin)

SUBMITTED: April 5, 1961

Card 3/4

10.2000
26.2311

30467
S/139/61/000/005/003/014
E032/E514

AUTHORS: Pu[illegible] and Stepanov, V.G.

TITLE: Diamagnetic properties of plasma excited in argon and neon

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika no.5, 1961, 26-29

TEXT: The authors have measured the magnetic susceptibility of plasma using the method described in the previous paper [illegible] Izv. vuzov, Fizika [illegible] (1960)). The discharge excitation frequency was [illegible] 380 kc/s and therefore the [illegible] cyclotron [illegible] avoided. High pressures were used so that the constant magnetic field had no effect on the intensity of the ring discharge. The results obtained are indicated in Figs.1 and 2. It is argued that the results are in good agreement with the formula

$$kn_e \frac{I}{\ldots} \ldots \left[\ldots \right] \quad (1)$$

X

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30467

where M is the magnetic moment per unit volume of the plasma, T_e and T_i are the electron and ion temperatures of the plasma, H is the constant axial magnetic field, [illegible] and [illegible] are the electron and ion [illegible], [illegible] and [illegible] are the time intervals between collisions and n is the charge density. The finite magnetic moment [illegible] as a result of non-equilibrium. The latter may be due to the radial drift of electrons and ions towards the walls. Ambipolar diffusion towards the walls in a magnetic field gives rise to [illegible] effect which is the direct result of the [illegible] in the plasma. It is shown that when [illegible] ≪ [illegible] are roughly constant, then

[illegible] (7)

where [illegible]. This result is in agreement with experiment [illegible]. The character of the dependence of the [illegible] of plasma on the gas

pressure is determined by the magnitude of $\omega_e \tau_e$. There are 2 figures and 12 references: 8 Soviet and 4 non-Soviet. The English-language references read as follows: Ref.1: L.Tanks, Phys.Rev., 56, 360,1939; Ref.7: E.I.Gordon, Conf.on Extrem.High Temp., Boston, Mass., March 18-19, p.137, 1958; Ref.10: R.N. Hall, Rev.Scient.Instrum., 19,905,1948.

ASSOCIATIONS: Ural'skiy politekhnicheskiy institut imeni S.M.Kirova (Ural' Polytechnical Institute imeni S.M.Kirov) and Ural'skiy filial AN SSSR (Ural' Branch, AS USSR)

SUBMITTED: August 10, 1960

Card 3/4

S/181/62/004/003/012/045
B102/B104

AUTHORS: Vinokurov, V. M., Zaripov, M. M., Stepanov, V. G., Pol'skiy, Yu. Ye., Chirkin, G. K., and Shekun, L. Ya.

TITLE: Paramagnetic resonance of trivalent chromium in andalusite

PERIODICAL: Fizika tverdogo tela, v. 4, no. 3, 1962, 646 - 649

TEXT: In Al_2SiO_5 there are two magnetically non-equivalent types of Cr^{3+} ions: the z-axes of both lie in the ab plane but diverge by an angle of 77°, the y-axes lie in the same plane, the x-axes coincide with the direction of the c-axis of the crystal. The z-axes of the Fe^{3+} ions diverge by 57.8°, the angle between the z-axes of the first types of Fe^{3+} and Cr^{3+} ions is 22.6°. The Cr^{3+} electron paramagnetic resonance in Al_2SiO_5 was measured at 9431 Mcps. The angular dependence of the resonance field was determined for the transition $M = -3/2 \rightarrow -1/2$ (M - magnetic quantum number). For $\vec{H} \parallel z$, $g_{eff} \approx 2$, for $\vec{H} \parallel x$ and $\vec{H} \parallel y$, $g_{eff} \approx 4$, i. e. the initial splitting

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δ of the spin quadruplet of $Cr^{3+} > 10^{10}$ cps. The resonance values of H do not coincide for $\vec{H} \| x$ and $\vec{H} \| y$. The spin Hamiltonian is

$$\mathcal{H} = D\left[S_z^2 - \frac{1}{3}S(S+1)\right] + E(S_x^2 - S_y^2) + \beta(g_x H_x S_x + g_y H_y S_y + g_z H_z S_z) \quad (1);$$

its constants are: S=3/2, $g_{\parallel} = 1.976$, $g_{\perp} = 1.985$, $D = 15.95 \cdot 10^9$ cps, $E = 0.60 \cdot 10^9$ cps. The initial splitting δ is $(32.0 \pm 0.1) \cdot 10^9$ cps, which agrees well with the theoretical value ($\delta = 2\sqrt{D^2+3E^2} = 31.97 \cdot 10^9$ cps). O. I. Mar'yakhina is thanked for help and S. A. Al'tshuler for interest. There are 3 figures and 3 references: 1 Soviet and 2 non-Soviet. The English-language references are: R. W. G. Wyckoff. Crystal Structure, II, 1951; A. Abragam M. H. L. Pryce. Proc. Roy. Soc. A205, 135, 1951.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet imeni V. I. Ul'yanova-Lenina (Kazan' State University imeni V. I. Ul'yanov-Lenin)

SUBMITTED: October 16, 1961

Card 2/2

VINOKUROV, V.M.; ZARIPOV, M.M.; POL'SKIY, Yu.Ye.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Electron paramagnetic resonance of Gd^{3+} and GaF_2.
Fiz. tver. tela 4 no.8:2238-2242 Ag '62. (MIRA 15:11)

1. Kazanskiy gosudarstvennyy universitet imeni V.I. Ul'yanova-Lenina.
(Paramagnetic resonance and relaxation)
(Gadolinium)
(Calcium fluoride)

ARKHANGEL'SKAYA, Ye.D.; ZARTHOV, M.M.; FOL'SKIY, Yu.Ye.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Electron paramagnetic resonance of Cr^{3+} in $K_2Zn(SO_4)_2 \cdot 6H_2O$. Fiz. tver. tela 4 no.9:2530-2533 S '62. (MIRA 15:9)

1. Kazanskiy gosudarstvennyy universitet imeni V.I. Ul'yanova-Lenina.

(Paramagnetic resonance and relaxation)
(Tutton's salts)

VINOKUROV, V.M.; ZARIPOV, M.M.; POL'SKIY, Yu.Ye.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Studying the ismorphous features of Fe^{3+} ions in andalusite by the paramagnetic resonance method. Kristallografiia 7 no.2: 318-320 Mr-Ap '62. (MIRA 15:4)

1. Kazanskiy gosudarstvennyy universitet imeni Ul'yanova-Lenina. (Andalusite) (Paramagnetic resonance and relaxation)

VINOKUROV, V.M.; ZARIPOV, M.M.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Electron paramagnetic resonance of Eu^{2+} ions in BaF_2 and SrF_2 single crystals. Fiz. tver. tela 5 no.7:1936-1939 Jl '63. (MIRA 16:9)

1. Kazanskiy gosudarstvennyy universitet imeni V.I.Ul'yanova-Lenina.
(Paramagnetic resonance and relaxation--Spectra)
(Barium fluoride) (Strontium fluoride)

VINOKUROV, V.N.; ZAKIPOV, M.N., STEPANOV, V.G., CHERKIN, G.K.; SHEKUN, L.Ya.

Paramagnetic resonance of Nb^{4+} ions in zircon single crystals. Fiz. tver. tela 5 no.7:2034-2035 Jl '63. (MIRA 16:9)

1. Kazanskiy gosudarstvennyy universitet imeni V.I.Ul'yanova-Lenina.

(Paramagnetic resonance and relaxation)
(Zircon crystals)

VINOKUROV, V.M.; ZAKIPOV, M.M.; POL'SKIY, Yu.Ye.; STEPANOV, V.G.; CHIRKIN, G.K.; SHEKUN, L.Ya.

Electron paramagnetic resonance of Gd^{3+} in CaF_2. Fiz. tver. tela 5 no.10:2902-2907 O '63. (MIRA 16:11)

1. Kazanskiy gosudarstvennyy universitet im. V.I. Ul'yanova-Lenina.

L 41398-65 EEC(b)-2/EWT(1)/T Pi-4 IJP(c) GG
ACCESSION NR: AR5009691 UR/0058/65/000/002/D054/D054

SOURCE: Ref. zh. Fizika, Abs. 2D399

AUTHORS: Arkhangel'skaya, Ye. D.; Vinokurov, V. M.; Zaripov, M. M.; Pol'skiy, Yu. Ye.; Stepanov, V. G.; Chirkin, G. K.; Shekun, L. Ya.

TITLE: Investigation of paramagnetic resonance spectra in crystals

CITED SOURCE: Sb. Itog. nauchn. konferentsiya Kazansk. un-ta za 1962 g. Kazan', Kazansk. un-t, 1963, 3-4

TOPIC TAGS: electron paramagnetic resonance, epr spectrum, crystal field symmetry, spin Hamiltonian, paramagnetic ion

TRANSLATION: The results of research on epr in crystals are briefly listed. The spectrum of Gd^{3+} in CaF_2 is due to three types of Gd^{3+} ions, which are in fields of cubic, tetragonal, and trigonal symmetry. The epr effect in $BaTiSi_3O_3$ is due to Fe^{3+} ions in a trigonal field. The spectrum of the Cr^{3+} ions that replace Zn^{2+} in $K_2Zn(SO_4)_2 \cdot 6H_2O$ is interpreted as corresponding to two magnetic $Cr^{3+}(OH)_6$ com-

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ACCESSION NR: AR5009691

plexes. The constants of the corresponding spin Hamiltonians are obtained. The spectrum of Mn^{2+} in NH_4Cl is identified with the presence of three magnetically non-equivalent Mn^{2+} ions in a field of axial symmetry. The results of calculations of the energy spectrum of a paramagnetic ion situated in a field of axial symmetry, carried out in the approximation of a strong magnetic field, are used to determine the constants of the spin Hamiltonian of Mn^{2+} in calcite. A. Vashman.

SUB CODE: NP ENCL: 00

Card 2/2

S/051/63/014/003/013/019
E039/E120

AUTHORS: Zaripov, M.M., Murtazin, Sh.F., and Stepanov, V.G.

TITLE: On the calculation of the paramagnetic resonance spectrum of Mn^{2+}

PERIODICAL: Optika i spektroskopiya, v.14, no.3, 1963, 421-422

TEXT: The fine and hyperfine structure of the paramagnetic resonance spectrum of Mn^{2+} for natural single crystals of calcite $CaCO_3$ is described (F.K. Hurd, M. Sachs, W.D. Hershberger, Phys. Rev., v.93, 1954, 373) by a spin Hamiltonian of the following form:

$$\mathcal{H} = g_{\parallel}\beta H_z S_z + g_{\perp}\beta(H_x S_x + H_y S_y) + D\left[S_z^2 - \frac{1}{3}S(S+1)\right] +$$

$$+ \frac{F}{180}\left[35S_z^4 - 30S(S+1)S_z^2 + 25S_z^2 - 6S(S+1) + 3S^2(S+1)^2\right] +$$

$$+ AI_z S_z + B(S_x I_x + S_y I_y) \qquad (1)$$

where with $H \parallel z$ $D = 81 \pm 0.4$, $F = 61.632$, $A = 93.95 \pm 0.05$, $g_{\parallel} = 2.0022 \pm 0.0006$; with $H_{\perp}$ z $D = 79.4 \pm 0.4$, $F = 61.632$,

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B = 93.90 ± 0.05, g = 2.0014 ± 0.0006. D, F, A and B are in oersteds. It is shown that this form of spin Hamiltonian is not applicable for describing the Mn^{2+} EPR spectrum, hence the determination of Eq.(1) is repeated. The denominator of the terms in the second and fourth approximations must depend not only on the Zeeman energy, but on the coefficients D, F and A, which were not calculated by Hurd et al. In order to obtain an expression for $E_{M, m}$ in compact form the proper value of Eq.(1) is calculated by another method. The energy level is determined to the third approximation and the results are presented in the form:

With H || z,

$$E_{M, m} = g_{\beta}\beta HM + D\left[M^2 - \frac{1}{3}S(S+1)\right] + f(M) + AMm +$$
$$+ \frac{A^2}{2g_{\beta}\beta H}\left(M[I(I+1) - m^2] - m[S(S+1) - M^2]\right) +$$
$$+ \frac{A^2}{(2g_{\beta}\beta H)^2}[S(S+1) - M(M+1)][I(I+1) - m(m-1)] \times$$
$$\times [D(2M+1) + f(M+1) - f(M) + A(m - M - 1)] + \qquad (2)$$
$$+ \frac{A^2}{(2g_{\beta}\beta H)^2}[S(S+1) - M(M-1)][I(I+1) - m(m+1)] \times$$
$$\times [-D(2M-1) + f(M-1) - f(M) + A(-m + M - 1)],$$

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On the calculation of the ... S/051/63/014/003/013/019
E039/E120

for $H \perp z$

$$E_{M,m} = g_\perp \beta H M - \frac{D}{2}\left[M^2 - \frac{1}{3}S(S+1)\right] + \frac{3}{8}f(M) + BMm +$$

$$+ \frac{D^2}{8g_\perp \beta H}\left(M\left[2S(S+1)-1\right]-2M^3\right) + \frac{A^2}{2g_\perp \beta H}\left(M\left[I(I+1) - m^2\right] - m\left[S(S+1)-M^2\right]\right) + \frac{A^2}{(2g_\perp \beta H)^2}\left[S(S+1)-M(M+1)\right]\left[I(I+1)-m(m-1)\right]\times$$

$$\times\left[-\frac{D}{2}(2M+1)+\frac{3}{8}f(M+1)-\frac{3}{8}f(M)+A(m-M-1)\right] +$$

$$+ \frac{A^2}{(2g_\perp \beta H)^2}\left[S(S+1)-M(M-1)\right]\left[I(I+1)-m(m+1)\right]\times \qquad (2)$$

$$\times\left[\frac{D}{2}(2M-1)+\frac{3}{8}f(M-1)-\frac{3}{8}f(M)+A(-m+M-1)\right] +$$

$$+ \frac{D^2}{(8g_\perp \beta H)^2}\left[S(S+1)-M(M-1)\right]\left[S(S+1)-(M-1)(M-2)\right]\times$$

$$\times\left[2D(M-1)+\frac{3}{8}f(M-2)-\frac{3}{8}f(M)-2Am\right] +$$

$$+ \frac{D^2}{(8g_\perp \beta H)^2}\left[S(S+1)-M(M+1)\right]\left[S(S+1)-(M+1)(M+2)\right]\times$$

$$\times\left[-2D(M+1)+\frac{3}{8}f(M+2)-\frac{3}{8}f(M)+2Am\right].$$

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On the calculation of the ... S/051/63/014/003/013/019
E039/E120

where $f(M) = \frac{F}{180}\left[35M^4 - 30M^2S(S+1) + 25M^2 - 6S(S+1)+3S^2(S+1)^2\right]$;
M and m are magnetic quantum numbers corresponding to electron and nuclear spin. With calculations of the second and third approximation it is assumed that A = B. By the use of this expression the position of the absorption lines is calculated (determined from the resonance condition $E_{M,m} - E_{M-1,m} = h\nu$) and agree with the experimental results within the error of measurement if the following values for the constants are assumed:

For $H \parallel z$ D = 81, F = 7.704, A = 93.95, $g_{\parallel} = 2.0018$;

For $H \perp z$, D = 81, F = 7.704, B = 94.40, $g_{\perp} = 2.0013$.

For determining these constants the results of measurements carried out by Hurd were used.

SUBMITTED: July 20, 1962

Card 4/4

ACCESSION NO: AP4015491 S/0181/64/006/002/0380/0381

AUTHORS: Vinokurov, V. M.; Stepanov, V. G.

TITLE: Electron paramagnetic resonance of Mn^{2+} in single crystals of CaF_2, SrF_2, and BaF_2

SOURCE: Fizikia tverdogo tela, v. 6, no. 2, 1964, 380-381

TOPIC TAGS: electron paramagnetic resonance, spin Hamiltonian, Mn sup 2+, fluorite, CaF sub 2, SrF sub 2, BaF sub 2, magnetic dipole interaction, covalent bond, cubic lattice

ABSTRACT: In studying single crystals of SrF_2 with Mn, the authors observed a spectrum quite similar to the spectrum of Mn^{2+} with fluorite obtained by J. M. Baker, B. Bleaney, and W. Hayes (Proc. Roy. Soc., 247, 141, 1958). They determined the Hamiltonian constants for Mn^{2+} in SrF_2, BaF_2, and CaF_2 and compared them with the results of several other authors. However, they did not have samples with Mn concentrations lower than 0.05%, and the width of the line ($\sim$ 4 gauss) was such that it was not possible to determine reliably the constants a and A_p (describing the direct magnetic dipole interaction due to overlapping of electron clouds of Mn^{2+} and F^- ions). The authors conclude, nevertheless, that the apparent consistent

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ACCESSION NO: AP4013491

increase of A_p in the series BaF_2-SrF_2-CaF_2 undoubtedly indicates increase in degree of covalency. There is considerable disagreement among the compared values for the g factors, but the authors think their values more reliable because they were measured at ~ 36 kilomegacycles, where the correction for the second approximation has a value less than 1 gauss. "In conclusion, the authors express their thanks to P. P. Feofilov for submitting the samples and to L. Ya. Shekun for valuable suggestions during the work." Orig. art. has: 1 table and 2 formulas.

ASSOCIATION: Kazanskiy gosudarstvenny*y universitet im. V. I. Ul'yanova-Lenina (Kazan' State University)

SUBMITTED: 08Jul63 DATE ACQ: 03Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 001 OTHER: 005

Card 2/2

ACCESSION NR: AP4028440 S/0181/64/006/004/1125/1129

AUTHORS: Vinokurov, V. M.; Zaripov, M. M.; Stepanov, V. G.

TITLE: Electron paramagnetic resonance of Mn^{2+} in apatite

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1125-1129

TOPIC TAGS: electron paramagnetic resonance, paramagnetic resonance, Mn^{2+}, apatite, spin Hamiltonian, resonance transition, spectral line, second approximation, third approximation, apatite single crystal

ABSTRACT: The authors investigated the electron paramagnetic resonance spectrum of Mn^{2+} ions isomorphously replacing Ca^{2+} ions in single crystals of apatite. The study was made at frequencies from 10 000 to 50 000 megacycles. In comparing their results with theory it was found that the spectrum may be defined by the spin Hamiltonian with the following form:

$$\mathcal{H} = g_{\parallel}\beta H_z S_z + g_{\perp}\beta (H_x S_x + H_y S_y) + \frac{1}{3} b_2^0 O_2^0 + \frac{1}{60} b_4^0 O_4^0 + \frac{1}{60} b_4^3 O_4^3 + A S_z I_z + B (S_x I_x + S_y I_y),$$

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ACCESSION NR: AP4028440

in which the constants are $b_2^0 = 434.2 \pm 0.5$, $b_4^0 = 1.5 \pm 0.5$, $b_4^3 = 0 \pm 5$, $A = 92.5 \pm 0.5$, $B = 94.2 \pm 0.5$, and $g_{\parallel} = g_{\perp} = 2.0011 \pm 0.0005$ (all expressed in gauss).

Computations of the positions of resonance transitions with these constants show that at a frequency of $\sim$ 40 000 megacycles and with H $\parallel$ z the agreement with experimental values is within $\pm$ 2 gauss, and with H $\perp$ z the agreement is within $\pm$ 3 gauss. Computations were made with an accuracy up to the second approximation. Determination of the third-approximation correction gave a value less than 1 gauss. No effect of the member with b_4^3 on the position of the spectral lines with H $\parallel$ z or H $\perp$ z could be detected. This determination of the value of b_4^3 was made at orientations $\theta = 15$ and 30°. Orig. art. has: 1 figure and 3 formulas.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova-Lenina (Kazan' State University)

SUBMITTED: 24Jun63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 005

Card 2/2

VINOKHODOV, V.I.; [illegible], M.M.; STEPANOV, V.G.

Electron paramagnetic resonance of Mn^{2+} ions in gaylussite.
Geokhimiia no.12:1318-1319 D '64. (MIRA 18:3)

1. Kazanskiy gosudarstvennyy universitet.

ACCESSION NR: AP4028441 S/0181/64/006/004/1130/1137

AUTHORS: Vinokurov, V. M.; Zaripov, M. M.; Stepanov, V. G.

TITLE: [Electron] paramagnetic resonance of Mn^{2+} ions in diopside crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1130-1137

TOPIC TAGS: paramagnetic resonance, Mn^{2+}, Mn ion, diopside, diopside crystal, paramagnetic spectrum, spectral line, ionic bond, replacement, substitution

ABSTRACT: The authors made their study on Mn^{2+} ions in single pale-green cryatals of diopside. The measurements were made at room temperature at frequencies of $\sim$10 000 and $\sim$ 36 000 megacycles in fields up to 20 000 gauss. Sixty lines were observed in the paramagnetic resonance spectrum of diopside. A study of the angular dependence of this spectrum showed that Mn^{2+} ions replace Mg and Ca in diopside. According to the relative intensities of the spectral lines, the number of Mn^{2+} ions replacing Ca ions is somewhat greater than the number replacing Mg ions. It is entirely probable that the higher symmetry of the immediately surrounding complex of CaO_6 and the greater degree of ionic bond Mn--O favor the replacement of Ca by Mn^{2+}. Orig. art. has: 2 figures, 2 tables, and 6 formulas.

Card 1/2

ACCESSION NR: AP4028441

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova-Lenina (Kazan' State University)

SUBMITTED: 29Oct63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 005

Card 2/2

L 24796-65 EWT(m)/EWP(b)/EWP(t) IJP(c) JD/JG
ACCESSION NR: AP5003453 S/0181/65/007/001/0285/0286

28
27
B

AUTHORS: Kurkin, I. N.; Stepanov, V. G.

TITLE: Electron paramagnetic resonance of Gd^{3+} in artificial $SrMlO_4$

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 285-286

TOPIC TAGS: electron paramagnetic resonance, spin Hamiltonian, lead compound, spectral constant, strontium compound, gadolinium

27 27 27

ABSTRACT: Continuing earlier observations of electron paramagnetic resonance (Kurkin and L. Ya. Shekun, FTT v. 6, 1975, 1964), the authors observed EPR in single-crystal $SrMoO_4$ which, like the $PbMoO_4$ investigated previously, has the structure of scheelite. Comparison of the spectra of the two substances leads to the conclusion that all Gd^{3+} ions are magnetically equivalent, and the position of the EPR lines of the Gd^{3+} ion ($4f^7$, $^8S_{7/2}$) is described by the usual

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spin Hamiltonian of tetragonal symmetry with effective spin S = 7/2. The equation for the spin Hamiltonian is:

$$\mathcal{H} = g_{\parallel}\beta H_z S_z + g_{\perp}\beta(H_x S_x + H_y S_y) + \frac{1}{3} b_2^0 O_2^0 + \frac{1}{60}(b_4^0 O_4^0 + b_4^4 O_4^4) + \frac{1}{1260}(b_6^0 O_6^0 + b_6^4 O_6^4),$$

where z -- c-axis of the crystal. The table is shown in the enclosure. The constants of the Hamiltonian were determined by measurements with the field parallel and perpendicular to the c axis of the crystal. The constants are tabulated together with the earlier data for lead molybdate. The constants are very close to each other in both lattices, probably because the lattice parameters of these two crystals are nearly equal. Orig. art. has: 1 formula and 1 table.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Lenina

L 24796-65
ACCESSION NR: AP5003453

(Kazan' State University)

SUBMITTED: 28Jul64 ENCL: 01 SUB CODE: SS, NP

NR REF SOV: 001 OTHER: 000

Card 3/4

L 51403-65 EWG(j)/EWT(l)/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EWP(t)/EEC(b)-2/
EWP(b)/EWA(c) Pr-4/Ps-4/Pi-4/Pu-4 IJP(c) JD/JG/GG
ACCESSION NR: AP5010699 UR/0181/65/007/004/0985/0988

AUTHOR: Antipin, A. A.; Kurkin, I. N.; Stepanov, V. G.; Shekun, L. Ya.

TITLE: Paramagnetic resonance of terbium in single crystals of $PbMoO_4$

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 985-988

TOPIC TAGS: electron paramagnetic resonance, terbium, lead molybdate, spin Hamiltonian

ABSTRACT: In view of recent observation of EPR resonance of Tb^{3+} in artificial scheelite, the authors investigated the EPR of terbium in $PbMoO_4$ which has a similar structure. A single-crystal sample with volume 40 mm^3 was separated from a pellet drawn from a melt, and contained about 0.5% Tb. EPR of Tb^{3+} ions was observed at 4.2K. All the ions were magnetically equivalent. The experiments were made at wavelengths 3 cm and 8 mm. A microwave cavity was used which made it possible to rotate the sample about a horizontal axis without removing it from the helium bath. The 8 mm resonator was such that at helium temperatures the distance between the pole pieces could be decreased to 45 mm. No effect attributable to terbium could be detected at 10 and 12 Gcs in fields up to 7 kG. An intense spec-

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L 51403-65
ACCESSION NR: AP5010699

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trum of four equidistant lines, which undoubtedly belong to Tb^{3+} ($4f^8$, $^7F_6$) could be observed at ~36 and 46 Gcs. The constants of the effective Hamiltonian describing the line positions were determined, the longitudinal g-value being 17.8 ± ± 0.2. It is shown that the EPR is observed between singlets levels, where irreducible representations and wave-function forms are determined. The conditions under which the singlets are close to each other are found and an approximate formula is derived for the distance between them. "In conclusion we thank A. M. Morozov for preparing the crystals, A. M. Leushin for fruitful discussions, and P. P. Feofilov for continuous interest." Orig. art. has: 3 figures and 14 formulas.

ASSOCIATION: Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova (Lenina) (Kazan' State University)

SUBMITTED: 28Jul64 ENCL: 00 SUB CODE: SS, MP

NR REF SOV: 002 OTHER: 006

Card 2/2

[illegible], I.N.; [illegible], V.G.

Electron paramagnetic resonance of Gd^{3+} in synthetic [illegible]. Fiz. tver. tela 7 no.1:285-286 Ja '65. (MIRA 18:3)

1. Kazanskiy gosudarstvennyy universitet imeni Ul'yanova-Lenina.

VINOKUROV, V.M.; ZARIPOV, M.M.; [illegible], V.S.; STEPANOV, V.G.

Studying Mn^{++} isomorphism in beryls by the method of electronic paramagnetic resonance. Geokhimiia no.1:104 Ja '65. (MIRA 18:4)

1. Kazanskiy gosudarstvennyy universitet.

STEPANOV, V.G.

Analytical and synthetical activity during the process of visual recognition. Uch. zap. MGPI no.94:125-177 '63.
(MIRA 18:6)

L 9031-66 EWT(d)/EWT(m)/EWP(v)/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)/EWA(h)/EWA(c)
ACC NR: AP5024956 JD/HW SOURCE CODE: UR/0286/65/000/016/0018/0018

AUTHORS: Stepanov, V. G.; Pankratov, V. P.; Lomov, A. A.

ORG: none

TITLE: Dismountable tank for hydro-explosive forming. Class 7, No. 173696 [announced by Organization of the State Committee on Shipbuilding, SSSR (Organizatsiya gosudarstvennogo komiteta po sudostroyeniyu SSSR)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 16, 1965, 18

TOPIC TAGS: explosive forming, hydro explosive forming, explosion tank, metal-working

ABSTRACT: This Author Certificate presents a dismountable tank for hydro-explosive forming, consisting of stacked circular sections which are sealed along the perimeter and reinforced by external ribs (see Fig. 1). To increase life and flexibility of use, the sections can be disassembled vertically into two or more parts which have vertical ribs along the separation lines and which can be assembled by using clamps. To decrease the tank expansion during the blast, a second feature provides holes in the vertical ribs through which cables can be passed.

Card 1/2 UDC: 621.983.044.06

L 9031-66

ACC NR: AP5024956

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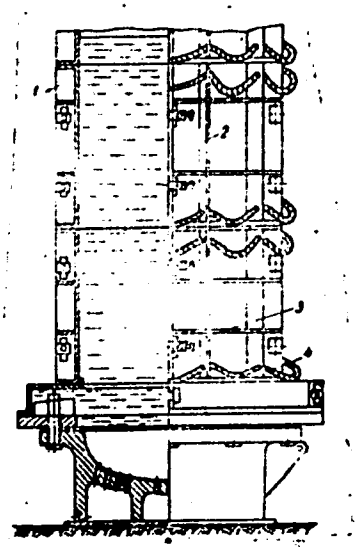

Fig. 1. 1 - Sections;
2 - vertical ribs;
3 - clamps;
4 - cable.

Orig. art. has: 1 figure.

SUB CODE: 13/ SUBM DATE: 12Feb64

Card 2/2

L 14136-66 EWT(1)/EWT(m)/EWP(t)/EWP(b) IJP(c) JD/WW/JG/GO

ACC NR: AP6000870 SOURCE CODE: UR/0181/65/007/012/3644/3645

ORG: Kazan' State University im. V. I. Ul'yanov-Lenin (Kazanskiy gosudarstvennyy universitet) 52 50

AUTHORS: Greznev, Yu. S.; Zaripov, M. M.; Stepanov, V. G. 21,44,55

TITLE: Electron paramagnetic resonance of terbium in CeO_2 27

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3644-3645

TOPIC TAGS: electron paramagnetic resonance, terbium, cerium compound, epr spectrum, hyperfine structure, line splitting

ABSTRACT: The authors observed paramagnetic resonance of Tb^{3+} and Tb^{4+} in single crystal CeO_2 doped with terbium at temperatures 4.2K and frequencies ~ 36 Gcs. It follows from the angular dependence of the EPR spectrum that there are four magnetically nonequivalent Tb^{3+} in the electric fields of trigonal symmetry. The EPR spectrum of Tb^{4+} is observed also at 77K, but not at room temperature. The

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ACC NR: AP6000870

angular dependence of the spectrum indicates that all the Tb^{4+} spectra are in electric fields of cubic fields. This shows that the substitution of Tb^{4+} for Ce^{4+} is isomorphic. When the magnetic field was parallel to the [100] axis, 11 groups were observed, with four lines each, in the range from 0.5 to 13 kG; the groups had different intensities. It is assumed that each group represents the fine structure of the EPR spectrum and the four components represent the hyperfine structure. The spectral analysis was based on the usual spin Hamiltonian. The values obtained for the initial splitting (~ 54 Gcs) and for the g factor (2.0136) are larger than those known for the ions Gd^{3+} and Eu^{2+} in electric fields of cubic symmetry. This suggests that the covalent nature of the bonds plays an important role. The results also indicate that the initial splitting increases monotonically with increasing unit-cell dimensions, unlike the Gd^{3+} ions. The data are insufficient to interpret this phenomenon. Authors thank V. A. Ioffe and Z. N. Zonn for supplying the CeO_2 crystals. Orig. art. has: 2 formulas.

SUB CODE: 20/ SUBM DATE: 03Jun65/ ORIG REF: 002/ OTH REF: 006

L 15731-66 EWT(m)/T/EWP(t)/EWP(b) IJP(c) JD/JG

ACC NR: AP6000892 SOURCE CODE: UR/0181/65/007/012/3688/3688

AUTHORS: Dernov-Pegarev, V. F.; Stepanov, V. G.; Zaripov, M. M.; Samoylovich, M. I.

ORG: Kazan' State University im. V. I. Ul'yanov-Lenin (Kazanskiy gosudarstvenny universitet)

TITLE: Investigation of EPR of Mn^{2+} ions in single crystal $ZnMoO_4$

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3688

TOPIC TAGS: zinc compound, molybdenum compound, epr spectrum, angular distribution, paramagnetic ion, spectral line, single crystal

ABSTRACT: The $ZnMoO_4$ were grown by the hydrothermal synthesis method. Investigation of the EPR spectrum at room temperature with a video spectroscope at 8 mm wavelength, disclosed a spectrum due to the divalent manganese and weaker lines of Cr^{3+} ions. The Cr^{3+} spectrum could not be investigated in detail because its lines overlapped the

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ACC NR: AP6000892

more intense lines of Mn^{2+}, which contaminated the crystals. The angular dependence of EPR spectrum indicates that the symmetry of the crystalline field acting on the Mn^{2+} ions is not higher than rhombic, so that the spectrum can be described with the spin Hamiltonian of the rhombic system, for which the constants are given. The orientation of the z axis of Mn^{2+} in $ZnMoO_4$ coincides with the orientation obtained for Mn^{2+} in $CdWO_4$. Authors thank Ye. A. Pobedimskaya for the goniometric measurements. Orig. art. has: 1 formula.

SUB CODE: 07/ SUBM DATE: 14Jul65/ OTH REF: 001

VINOGRADOV, V.N., [illegible]; [illegible] V.I.; STEPANOV, V.G.

Electron paramagnetic resonance of Mn^{2+} ions in cordierite. Geokhimiia no. 12:1486-1487 D '65 (MIRA 19:1)

1. Kazanskiy gosudarstvennyy universitet. Submitted November 20, 1964.

L 22103-66 EWT(1) IJP(c) WW/GG

ACC NR: AP6012938 SOURCE CODE: UR/0120/65/000/002/0202/0204

AUTHOR: Shvets, A. D.; Antipin, A. A.; Kirillov, Ye. I.; Stepanov, V. G.; Chirkin, G. K.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR); Kazan' State University (Kazanskiy gosudarstvennyy universitet)

TITLE: Low temperature device for studying EPR

SOURCE: Pribory i tekhnika eksperimenta, no. 2, 1965, 202-204

TOPIC TAGS: electron paramagnetic resonance, cryogenic device, crystallography

ABSTRACT: A device is described and diagrammed which is designed to study electron paramagnetic resonance in the 8 mm wavelength range in crystals at low temperatures, down to 0.314° K. For the experiments, the sample under study is attached to a column in a millimeter band resonator, attached at two places to a thin-walled stainless steel tube 16 mm in diameter. The resonator is tuned by moving Melchior waveguides, a communicating diphragm, and piston. The resonator, column, piston, and diaphragm are made of silvered brass. The lowest temperature is obtained by evacuation of vapor over liquid He^3 with an adsorbtion pump. Orig. art. has: 1 figure. [JPRS]

SUB CODE: 20 / SUBM DATE: 27Jul64 / ORIG REF: 001

Card 1/1 UDC: 536.483

L 21400-66 EWT(m)/EWP(t) IJP(c) JD/JG
ACC NR: AP6003795 SOURCE CODE: UR/0181/66/008/001/0238/0239

AUTHORS: Zaripov, M. M.; Livanova, L. D.; Stepanov, V. G.; Falin, M. L.

ORG: Kazan' State University im. V. I. Ul'yanov-Lenin (Kazanskiy gosudarstvennyy universitet)

TITLE: Electron paramagnetic resonance of Gd^{3+} in double molybdate of yttrium and lanthanum

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 238-239

TOPIC TAGS: yttrium compound, lanthanum compound, molybdenum containing alloy, gadolinium, epr spectrum, optic spectrum, rare earth element, line width, crystal symmetry, electron paramagnetic resonance

ABSTRACT: In view of the appreciable attention paid recently to the study of optical and EPR spectra of compounds of the type $M^{2+}M^{6+}O_4$ (M^{2+} = Ca, Sr, Ba, Pb; M^{6+} = Mo^{6+}, W^{6+}), alloyed with elements of the rare-earth group, the authors have grown and investigated by the

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L 21400-66
ACC NR: AP6003795

EPR method single crystals of $M^+Y(MoO_4)_2$ and $M^+La(MoO_4)_2$, where M^+ = Na, Li, and K with add mixture of 0.1 atomic per cent gadolinium. The crystals were grown by solution in the melt, in a programmed oven whose temperature could be set accurate to 1C in the limit 600 -- 1200C. The crystal growth procedure is briefly described. In all the crystals, including $KY(MoO_4)_2$, very broad absorption lines were observed, with the lines of the transition 1/2 -- 1/2 ($g \approx 1.99$) having a width of 200 Oe even for the field parallel to the z axis. The widths of the lines remain constant if the gadolinium concentration remains constant. The large width is attributed to the scatter of the axes of the local electric field acting on the magnetic ions. A distinct spectrum of the Gd^{3+} ions was observed in the $KY(MoO_4)_2$ single crystals. From the angular distribution of the EPR spectrum it is deduced that the structure $TY(MoO_4)_2$ has either monoclinic or rhombic syngony. The constants of the spin Hamiltonian has been evaluated and it is concluded from the near-equality of some of the constants for Gd^{3+} in crystals with scheelite structure, that the

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L 21400-66
ACC NR: AP6003795

nearest surrounding of Gd^{3+} ions in the $KY(MoO_4)_2$ are similar in structure in all these crystals. Orig. art. has: 1 formula

SUB CODE: 20/ SUB DATE: 12Jul65/ OTH REF: 002

Card 3/3 UDC

L 21397-66 EWT(m)/T/EWP(t) IJP(c) JD/JG

ACC NR: AP6003799 SOURCE CODE: UR/0181/66/008/001/0247/0248

AUTHOR: Dernov-Pegarev, V. F.; Zaripov, M. M.; Samoylovich, M. I.; Stepanov, V. G.

ORG: Kazan' State University im. V. I. Ul'yanov-Lenin (Kazanskiy gosudarstvennyy universitet)

TITLE: EPR of Gd^{3+} in $CdMoO_4$

SOURCE: Fizika tverdogo tela, v. 8. no. 1, 1966, 247-248

TOPIC TAGS: gadolinium, cadmium compound, molybdenum compound, electron paramagnetic resonance, single crystal, crystal lattice structure

ABSTRACT: The authors investigated the EPR spectrum of Gd^{3+} in single-crystal $CdMoO_4$ at a frequency ~37 Gcs and at room temperature. The single crystal was grown by the hydrothermal method and has a scheelite structure. One type of Gd^{3+} ions was observed, situated in electric fields of tetragonal symmetry (z axis parallel to the c axis of the crystal). This indicates isomorphic substitution of Gd^{3+} for Gd^{2+}. The parameters of the spin Hamiltonian are determined for this constant and are found to be in agreement with those obtained for other single crystals with scheelite structure ($CaWO_4$, $PbMoO_4$, and $SrMoO_4$). The authors thank O. I. Mar'yakhina for computer processing of the experimental data. Orig. art. has: 1 figure and 1 formula.

SUB CODE: 20/ SUBM DATE: 16Jul65/ ORIG REF: 002/ OTH REF: 001

Card 1/1 ULR

ACC NR: AP6037021 (A,N) SOURCE CODE: UR/0181/66/008/011/3445/3445

AUTHOR: Zaripov, M. M.; Potkin, L. I.; Samoylovich, M. I.; Stepanov, V. G.

ORG: Kazan' State University im. V. I. Ul'yanov-Lenin (Kazanskiy gosudarstvennyy universitet)

TITLE: Electronic paramagnetic resonance of gadolinium 3 ions in barium tungstate

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3445

TOPIC TAGS: crystal, gadolinium, ~~gadolinium~~ ion, electronic paramagnetic resonance, ~~scheelite~~, ~~monocrystal~~, barium tungstate, EPR spectrum, electric field

ABSTRACT: A study was made of the electron paramagnetic resonance spectrum in hydrothermally grown crystals containing $\sim 0.1\%$ Gd^{3+} ions. In $BaWO_4$, as in earlier studied bases, one type of Gd^{3+} ions was found, occurring in an electrical field of tetragonal symmetry. Measurements of the spectrum were made at room temperature at $\lambda \sim 8$ мм. Approximate values of the parameters of hamiltonian spin, determined by the method of the perturbation theory, were

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ACC NR: AP6037021

verified on an electronic computer. It was found that at $g = 1.991$ $b_2^0 = 873$ gs, $b_4^0 = 13$ gs, $b_4^4 = -113$ gs, $b_6^0 = b_6^6 = 0$. For $H \| z$ the position of resonance lines is described to an accuracy of ± 3 gs, and for $H \perp z - \pm 15$ gs. This provides supplementary data on the splitting of the ground state of Gd^{3+} ions by an electric field in crystals of a homologous series of scheelite. [Translation of abstract] [SP]

SUB CODE: 20/SUBM DATE: 13Jun66/

Card 2/2

ACC NR: AT7003992 SOURCE CODE: UR/0000/66/000/000/0043/0047

AUTHOR: Stepanov, V. G.; Babushkin, V. S.; Kravchenko, G. I.

ORG: none

TITLE: Electrodynamic generator with electron-resonance charger

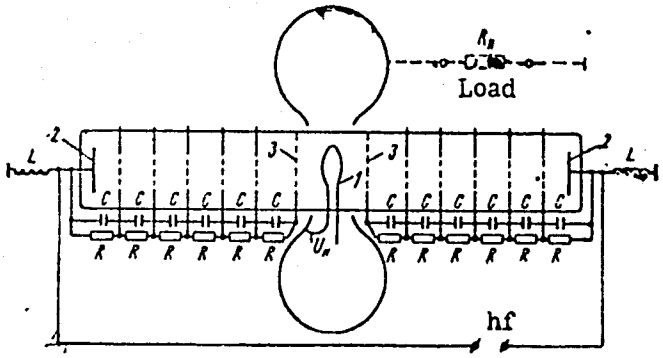
SOURCE: Mezhvuzovskaya konferentsiya po elektronnym uskoritelyam. 5th, Tomsk, 1964. Elektronnyye uskoriteli (Electron accelerators); trudy konferentsii. Moscow, Atomizdat, 1966, 43-47

TOPIC TAGS: electrodynamic generator, electron accelerator

ABSTRACT: The palletron generator suggested by A. M. Skellett (J. Appl. Phys., 19, 187, 1948) permits obtaining much heavier currents than those available in modern electrostatic generators; hence, a modified palletron, in which a toroidal cathode is charged to a high positive potential (see figure) is theoretically considered. A new method is suggested for calculating the potential field at the electrodes connected to a resistor-capacitor divider. A numerical estimate shows

Card 1/2

ACC NR: AT7003992



A modified palletron: 1 - emitter, 2 - collectors, 3 - accelerating electrodes, U_H - heater voltage of the emitter

that a 1-Mv palletron would have a half-height of 0.94 m, an accelerating voltage of 10 kv (amplitude) at 75 kc, and a maximum electric field strength of 20 kv/cm. Orig. art. has: 1 figure and 8 formulas.

SUB CODE: 09 / SUBM DATE: 06Mar66 / ORIG REF: 001 / OTH REF: 001

Card 2/2

ACC NR: AP7005348 SOURCE CODE: UR/0181/67/009/001/0209/0214

AUTHOR: Zaripov, M. M.; Kropotov, V. S.; Livanova, L. D.; Stepanov, V. G.

ORG: Kazan' State University im. V. I. Ul'yanov (Lenin) (Kazanskiy gosudarstvennyy universitet)

TITLE: Electron paramagnetic resonance of vanadium and chromium in CaF_2

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 209-214

TOPIC TAGS: calcium fluoride, electron paramagnetic resonance, paramagnetic ion, vanadium, chromium, crystal lattice structure

ABSTRACT: The purpose of the investigation was to determine the behavior of iron-group elements in crystals in which the ligand atoms form a cube or a tetrahedron, rather than the deformed octahedron characteristic of most crystals used for EPR research. To this end, CaF_2 crystals doped with V and Cr were grown under controlled conditions and their EPR spectra studied. No EPR spectra could be produced in the CaF_2, even at 4.2K, unless a small amount of PbF_2 (0.5 - 1.5 wt.%) was added. The optimum was 0.6 wt.%. A type-I EPR spectrum of vanadium was then observed at 77K. When the CaF_2 crystal was prepared in a fluoriding atmosphere (by burning teflon in the furnace), a type-II EPR spectrum of vanadium was observed at 77K. The same treatment was necessary to grow crystals with observable EPR spectrum of chromium. A formal analysis of the EPR spectra on the basis of the spin Hamiltonian is presented. The parameters of the spin Hamiltonians are determined. The type-I EPR

Card 1/2 UDC: none

ACC NR: AP7005348

spectrum is attributed to V^{++} ions, and the type-II spectrum to V^{+++} and Cr^{+++}. The results show that the ions V^{++} and Cr^{+++} are in the electric field of trigonal symmetry and those of V^{+++} in a field of cubic symmetry, which cannot be regarded as consisting of strong cubic and weak trigonal components. The trigonal component is related to the Jahn-Teller effect. The authors thank S. A. Al'tshuler and A. M. Prokhorov for a discussion of the results, and also L. K. Aminov and B. I. Kochelayev. Orig. art. has: 2 formulas. [02]

SUB CODE: 20/ SUBM DATE: 20Jun66/ ORIG REF: 002/ OTH REF: 005

ATD PRESS: 5116

Card 2/2

STEPANOV, V.I.

[Collection of exercises on accounting and reports in the savings bank system] Sbornik uprazhnenii po uchetu i otchetnosti v sisteme sberegatel'nykh kass. Izd. 2., perer.i dop. Moskva, Gosfinizdat, 1951. 149 p. (MLRA 6:11)
(Savings banks--Accounting)

USSR / General Section A

Abs Jour : Ref Zhur - Fizika, No 5, 1957, No

Author : Stepanov, V.I.
Inst : Not given
Title : The Tendency of V.M. Lomonosov to Go Outside the Framework of a Metaphysical World Views.

Orig Pub : Nauch. Tr. po filos. Belorus. un-t. 1956, vyp. 1, 56-63

Abstract : It is shown that the scientific-philosophical world views of Lomonosov contain elements of dialectics: the law of conservation of matter and motion, the idea of general universal connection between the phenomena, the idea of development, guesses concerning the various forms o motion of matter, etc.

Card : 1/1

ACC NR: AP7000360 (A,N) SOURCE CODE: UR/0413/66/000/022/0125/0125

INVENTOR: Stepanov, V. I.; Zakirov, R. Sh.

ORG: None

TITLE: A three-component piezoelectric accelerometer. Class 42, No. 188767

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 22, 1966, 125

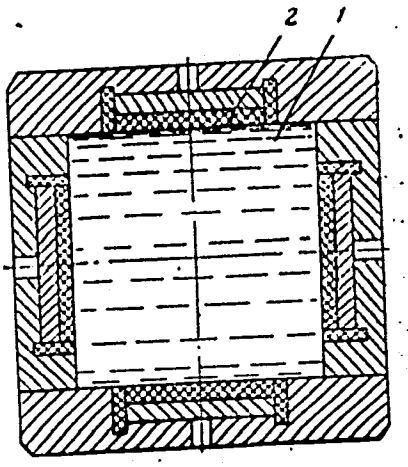
TOPIC TAGS: piezoelectric transducer, accelerometer, fluid sensor

ABSTRACT: This Author's Certificate introduces a three-component piezoelectric accelerometer with liquid inertial mass. To simplify manufacture of the gauge and to improve accuracy in measurement of components along the coordinate axes, the piezoelectric plates are situated in pairs along the normals to the three orthogonal axes, enclosing a cavity filled with liquid under pressure.

Card 1/2 UDC: 531.768:082.73

0930 3626

ACC NR: AP7000360



1--inertial mass; 2--piezoelectric plates

SUB CODE: 13, 14/ SUBM DATE: 03Jul65

Card 2/2

STEPANOV, V.I.

Acute intestinal obstruction. Zdrav. Kazakh. 21 no.9:16-21 '61. (MIRA 14:10)

1. Iz 1-oy Ust'-Kamenogorskoy gorodskoy bol'nitsy (glavnyy vrach - N.K.Kozhushko).

(INTESTINES—OBSTRUCTIONS)

STEPANOV, V.I.

USSR/Physics - Spectral analysis

Card 1/1 Pub. 43 - 51/62

Authors : Girin, O. P.; Zhidkova, Z. V.; Stepanov, V. I.; Ivanov, A. P.; and Toporets, A. S.

Title : Determination of the true absorption spectrum of diffusion colored objects by the spectrum of their diffusion reflection

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 728-729, Nov-Dec 1954

Abstract : Esperimental and theoretical investigations were conducted to determine the relation between the coefficient of diffusion reflection and the factors (internal and external) connected with the characteristics of the repulsing layer and the conditions of illumination. The method employed in measuring each component individually was based on the different properties of these components in relation to polarization. Results obtained are listed in detail.

Institution : .....

Submitted : .....

1. STEPANOV, V. I.

2. USSR (600)

4. Science

7. History of a great law (Mendeleyev's), Izd. 2-e. Moskva, Molodaia gvardiia, 1952.

9. Monthly List of Russian Accessions, Library of Congress, April, 1953, Uncl.

STEPANOV, V.I., inzh.; ZEYGARNIK, Yu.A., inzh.

Automatic measuring of the level of pulverized coal in intermediate bunkers. Energetik 9 no.4:5-7 Ap '61. (MIRA 14:8)

(Coal—Storage)
(Level indicators)

LITVINENKO, Ye.A., kand.tekhn.nauk; prinimali uchastiye: LEKAREV, V.A., gornyy insh.; KUZ'MENKO, V.P., gornyy insh.; STEPANOV, V.I., student; BARAMIKOV, A.A., student

Control of methane emission in mine sections. Ugol' Ukr. 4 no.5:14-16 My '60. (MIRA 13:8)

1. Khar'kovskiy gornyy institut.
(Donets Basin—Mine gases)

STEPANOV, V.I.; MOLEVA, V.A.

Ralstonite from central Kazakhstan, Kamchatka, and the Il'men Mountains. Zap.Vses.min.ob-va 91 no.5:556-572 '62. (MIRA 15:11)

1. Institut geologii rudnykh mestorozhdeniy, petrografii, mineralogii i geokhimii AN SSSR.
(Ralstonite)

СТЕПАНОВ В. И.

USSR/Cosmochemistry - Geochemistry. Hydrochemistry, I

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61299

Author: Lebedev, L. M., Stepanov, V. I.

Institution: None

Title: Nickel-Containing Calcite from [redacted]l'ya

Original Periodical: Tr. mineralog. muzeya AN SSSR, 1955, No 7, 158-161

Abstract: The authors have observed in limestone pits of Podol'skiy, Ruzskiy and Vereyskiy rayons of Moscow Oblast a greenish-yellow Ni-containing calcite, first discovered by A. Ye. Fersman. Chemical composition (in %): Al_2O_3 traces, CaO 56.28, NiO 0.10, CO_2 42.00, SO_3 1.93, Si, FeO and Mn not found. Spectral analysis showed also medium Sr lines, weak lines of Si, Fe, Mn, Na, Zr, Hf, Y, Yb, Zn and traces of lines of Ti, Cu, Bi. In 3 variegated allophanes and pyrolusite associated with the calcite, spectral analysis revealed: Ca, Be, Ni, Mg, Y, Cu, Zn, Nb, Ga, Mn, Ti, La, Co, P, Fe, Ba, Si, Al, Na, Sr and Tl. It is assumed that Ni is present in the calcite as a mechanical admixture of basic carbonate.

Card 1/1

STEPANOV, V.I.

Replacement of topaz by opal. Zap.Vses.min.ob-va 88 no.4:476-481 '59.
(MIRA 12:11)

1. Institut geologii rudnykh mestorozhdeniy, petrografii, mineralogii i geokhimii AN SSSR, Moskva.
(Topaz) (Opals)

STEPHNOV, V.I.

USSR/Automatics and telemechanics FD-2662

Card 1/1 Pub..10-9/15

Author : Stepanov, V. I. (Moscow)

Title : Pulse telemetering system of the Institute of Automatics and Telemechanics, Academy of Sciences of the USSR

Periodical : Avtom. i telem. 16, Jul-Aug 1955, 390-401

Abstract : The author describes the pulse telemetering system of the Institute of Automatics and Telemechanics, and gives the results of tests. He explains the principle of operation. He discusses the block diagram (sweep oscillator, commutator and channel pulse oscillator, frequency modulator, amplitude modulator, transmitting elements, amplifier, limiter, frequency discriminator, recorder, comparison cascade, etc.), time diagrams of pulses for various channels, volt-ampere characteristic curve of the diodes, circuit of peak balance cascade, circuit for the commutator in the receiver, and the main circuits of the transmitter and receiver. The author thanks V. A. Il'in, Dr. Tech. Sci., for his guidance. Four references, e.g. V. A. Il'in, "Multichannel telemetering devices," Sbornik Telemekhanizatsiya energosistem, [Symposium on telemetering of electric power systems], Acad. Sci. USSR Press, 1954.

Institution :

Submitted : March 6, 1955

IL'IN, V.A.; KURDYUKOV, K.P.; STAPANOV, V.I. (Moskva)

The KST-1 combined remote control system for dispersed objects. Avtom.i telem. 20 no.2:249-252 F '59. (MIRA 12:3)
(Remote control)

BARANOV, Yu.I., inzh.; KOSTOUSOV, N.L., inzh.; STEPANOV, V.I., inzh.

Remote-controlled fuel supply at a gas-generator station.
Mekh. i [illegible] proizv. 17 no.8:13-15 Ag '63. (MIRA 16:10)

KHOMYAKOV, A.P.; STEPANOV, V.I.; MOLEVA, T.A.; PUSHCHINA, A.V.

New mineral "tikhonenkovite" $SrAlF_4(OH,H_2O)$. Dokl. AN SSSR 156 no. 2:345-347 My '64. (MIRA 17:7)

1. Predstavleno akademikom N.V.Belovym.

L 55213-65
ACCESSION NR: AP5015259 UR/0286/65/000/009/0038/0038

3
B

AUTHOR: Stepanov, V. I.

TITLE: Cyclic discrete regulator. Class 21, No. 170565

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 9, 1965, 38

TOPIC TAGS: control circuit

ABSTRACT: This Author Certificate presents a cyclic discrete regulator containing two shaping stages connected to two counters whose outputs are connected to a logic "OR" unit, a discharge stage, an output transformer, and an operating unit (see Fig. 1 on the Enclosure). To increase the regulator response rate and its accuracy, two overflow switches are used. The input of each switch is connected to the output of the corresponding counter. The output of each switch is connected to the input of the discharge stage and to the output transformer. Orig. art. has: 1 diagram.

ASSOCIATION: none
SUBMITTED: 18Jan63 ENCL: 01 SUB CODE: EC
NO REF SOV: 000 OTHER: 000

Card 1/2

L 55213-65
ACCESSION NR: AP5015259

ENCLOSURE: 01

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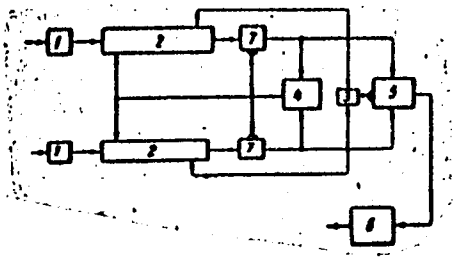


Fig. 1.

1- shaping stages; 2- counters; 3- logic unit; 4- discharge stage; 5- output transformer; 6- operating unit; 7- overflow switches

Card 2/2

L 60395-65

ACCESSION NR: AP5016975 UR/0280/65/000/003/0122/0131 4/B

AUTHOR: Stepanov, V. I. (Moscow)

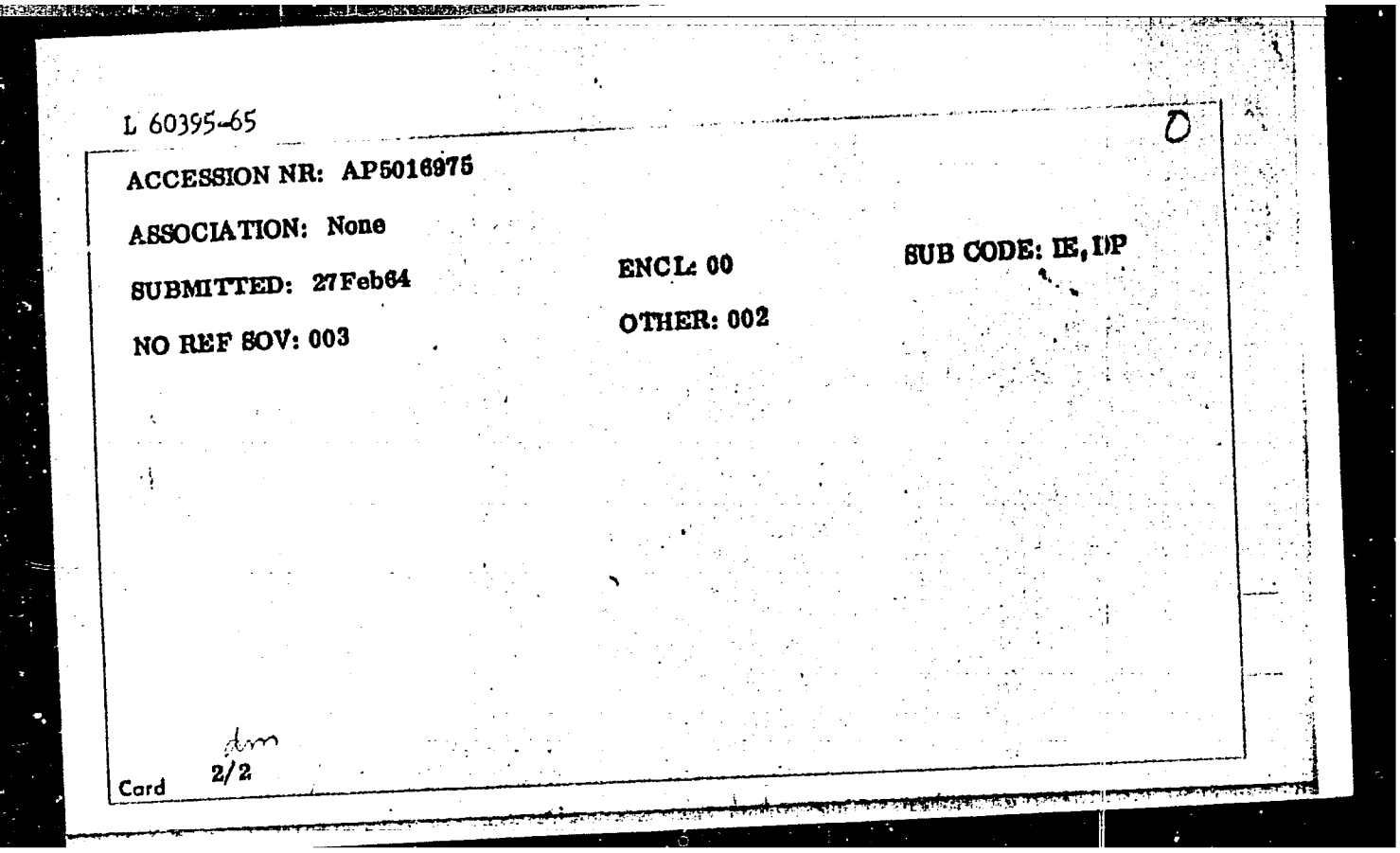
TITLE: Statistical studies of an extrapolation system with suppression of disturbances by a mixed method of accumulation

SOURCE: AN SSSR. Izvestiya. Tekhnicheskaya kibernetika, no. 3, 1965, 122-131

TOPIC TAGS: extrapolation system, mixed accumulation, disturbance suppression, optimized parameter accumulation, extremum tracking error

ABSTRACT: The author investigated the operation of an extrapolation extremum system with disturbance suppression by accumulating the optimized parameter in a manner representing a combination of a general and variable accumulation. He established an approximate expression for the mean error in extremum tracking and determined the form of random disturbances at the output for which it is advantageous to use the general or mixed approach for the accumulation of the optimized parameter. The study is carried out on an object lacking inertia and having a parabolic characteristic. Orig. art. has: 49 formulas and 1 figure.

Card 1/2



L 60395-65

ACCESSION NR: AP5016975

ASSOCIATION: None

SUBMITTED: 27Feb64 ENCL: 00 SUB CODE: IE, IP

NO REF SOV: 003 OTHER: 002

Card 2/2

STEPANOV, V.I. [deceased]; BRZHEZOVSKIY, A.I.

Reservoir rock properties of massifs of reef origin. Neftegaz. geol. i geofiz. no.11:6-9 '64. (MIRA 18:3)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologorazvedochnyy neftyanoy institut, Moskva.

DEMENT'YEV, V.A., kand.tekhn.nauk; OSHANIN, D.A., kand.pedagog.nauk; VENDA, V.F., inzh.; GROUNDON, R.R., inzh.; MEL'NIKOV, I.V., inzh.; NECHAYEV, B.Ya., inzh.; RYBACHEV, N.V., inzh.; SMIGEL'SKIY, S.Ya., inzh.; STEPANOV, V.I., inzh.; TIMOFEYEV, V.A., inzh.; SHIROCHENSKIY, V.I., inzh.

Control of the operation of an overall automatic block. Mekh. i avtom.proizv. 19 no.2:47-52 F '65. (MIRA 18:3)

45778-66 EEC(k)-2/EWP(k)/EWT(l)/EWT(m)/T/EWP(e) IJP(c) WH/WG

ACC NR: AP6031986 SOURCE CODE: UR/0386/66/004/005/0177/0180

AUTHOR: Askar'yan, G. A.; Rabinovich, M. S.; Smirnova, A. D.; Stepanov, V. K.; Studenov, V. B.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Excitation of signals in a negatively charged post of an antenna under the influence of an unfocused laser beam

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 5, 1966, 177-180

TOPIC TAGS: laser application, shf antenna, electron emission

ABSTRACT: The authors describe the results of an investigation of current pulses produced when an unfocused laser beam strikes a metallic electrode or a post that serves as an antenna, on which a negative potential is applied. An ordinary Q-switched ruby laser was used, whose beam was aimed onto an antenna post located several meters away and under a negative voltage $U \approx 0 - 3$ kev. The antenna post was connected to ground through a capacitor and a resistor. The pulse picked off the resistor was fed through a capacitor and amplifiers (UR-3 and UR-4) to an oscilloscope (S1-10). The pulse induced in the antenna was commensurate in length with the duration of the laser flash. The pulse amplitude was at first approximately proportional to the voltage applied to the antenna but at a voltage $\gtrsim 1$ kv the magnitude of the signal increased sharply with

Card 1/2

increasing voltage. No noticeable signals were registered at zero and positive potentials. The mechanism of the observed pulses is shown to be connected with the current produced when the electrons knocked out by the laser radiation are removed from the post. The production of free electrons may be connected with the photoeffect from the oxidized surface (if the surface is clean, the laser quantum energy is insufficient to produce the photoeffect), with the heating of the electrons on the surface of the metal upon absorption of the laser light, with a burst of photoelectric field emission, or with a cascade. If the role of the light were to consist of facilitating the cold emission under the influence of the field, or if cascade multiplication of the electrons in the gas at the post were to take place, then the dependence of the current on the voltage should be much stronger. It is possible that some of the foregoing processes are responsible for the intensification of this dependence at sufficiently large field intensities. When the gas pressure around the antenna decreases, the electron mobility increases and the voltage needed to remove the electrons can be small. The described effect can be used for remote excitation of receiving and transmitting antennas with the aid of a guided laser beam, to register and measure laser radiation power, etc. Orig. art. has: 2 figures and 1 formula. [02]

SUB CODE: 20, 09/ SUBM DATE: 16Jun66/ ATD PRESS: 5084

Card 2/2

ACC NR: AP7003206 SOURCE CODE: UR/0056/66/051/006/1654/1659

AUTHOR: Savchenko, M. M.; Stepanov, V. K.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Perturbation of a magnetic field by the laser spark plasma in the air

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1654-1659

TOPIC TAGS: nonlinear optics, air breakdown, laser spark, spark plasma, magnetic field, field perturbation, field plasma interaction

ABSTRACT:
This paper is a continuation of an earlier investigation (G. A. Askar'yan, M. S. Rabinovich, M. M. Savchenko, and A. D. Smirnova, ZhETF, PvR 1, 1, 1965, 9) of the interaction of a laser spark with a magnetic field. The experimental equipment shown in Fig. 1 consisted of a regular Q-switched ruby laser 1, the output from which was in the form of 1-j 40-nanosec pulses with a 10' beam divergence. The laser spark occurred at the focus of lens 6 (f = 4—10 cm). A 2200-oe magnetic field, parallel to the laser beam, was set up in the spark region by solenoid 9. Perturbation of the magnetic field was estimated in terms of the emf induced in measuring coil 8 during the occurrence of the laser spark. The size of the perturbing region was small in comparison with

Card 1/2 UDC: none

ACC NR: AP7003206

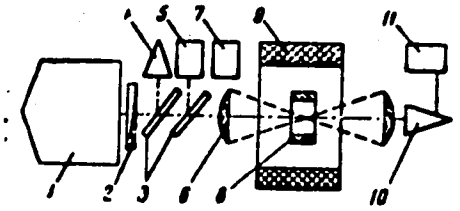


Fig. 1. Equipment setup

1 - Q-switched laser; 2 - variable filters; 3 - plane-parallel glass plates; 4 - first calorimeter; 5 - first photomultiplier; 6 - focusing lens; 7 - trigger photomultiplier; 8 - measuring coil; 9 - solenoid; 10 - second calorimeter; 11 - second photomultiplier.

the visible spark region, which extended 12 mm from the focus. The plasma generated during the breakdown moved radially in the positive direction, interacting with the longitudinal magnetic field. This interaction gave rise to ring currents, causing a diamagnetic plasma perturbation. The reduction of the lifetime of this perturbation to 30—40 μsec by the spark-generated shock wave resulted in the paramagnetic plasma perturbation. Assuming a 10^3-oe field and a shock wave velocity of 10^5 cm/sec, the mean spark plasma conductivity was estimated at 2.6×10^{15} sec^{-1}. Orig. art. has: 5 figures.

SUB CODE: 20/ SUBM DATE: 11Jul66/ ORIG REF: 003/ OTH REF: 001/
ATD PRESS: 5113

Card 2/2

L 30389-66 EEC(k)-2/EWP(k)/EWT(1)/FBD/T IJP(c) WG
ACC NR: AP6020790 SOURCE CODE: UR/0386/66/003/012/0465/0468

AUTHOR: Askar'yan, G. A.; Rabinovich, M. S.; Savchenko, M. M.; Stepanov, V. K.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy Institut Akademii nauk SSSR)

TITLE: Fast overlap of microwave radiation by an ionization aureole of a spark in a laser beam

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye v. 3, no. 12, 1966, 465-468

TOPIC TAGS: gas ionization, ionization phenomenon, ionized plasma, microwave plasma, SPARK SHOCK WAVE, LASER BEAM

ABSTRACT: This is a continuation of earlier investigations (Pis'ma ZhETF v. 1, no. 6, 18, 1965) of the ionization aureole behind the shock wave of a light spark in a laser beam. The present study deals with shorter times (tens and hundreds of nanoseconds), when the ionization leads the shock wave from the spark. The spark from a Q-switched laser beam was flashed in front of a radiating antenna fed from an 8-mm magnetron. The receiving antenna was placed either behind the spark (in aureole overlap investigations) or at different angles (in reflection investigations). The area of the microwave radiation overlap by the aureole was

Card 1/2

determined by comparing the overlap signal at different distances from the spark to the antenna axis and found to have a radius of 1.5 - 2 cm. The values of the reflection signals at different large angles, including back reflection, were commensurate with the overlap signal. This shows that the scattered radiation is due not only to the absorption diffraction, but also to the high reflectivity of the aureole plasma. The electron density in the latter is estimated to be ~10^{13} cm^{-3}, which is two orders of magnitude higher than the intensity obtained by the authors from polarization measurements (Pis'ma ZhETF v. 2, 503, 1965). The sparks and ionization aureoles differed for different gases (air, oxygen, argon, nitrogen, helium, hydrogen). The high speed of the strong overlap of radiation by the fast aureole after a time ~10 nsec, and the large overlap area, suggest that the fast aureole may be useful for sharp overlap, modulation, or diversion of microwave beams. The authors thank D. K. Akulina and A. D. Smirnova for valuable advice, and L. Kolomeytsev for help with the work. Orig. art. has: 2 figures. [02]

SUB CODE: 20/ SUBM DATE: 04Apr66/ ORIG REF: 002 / ATD PRESS: 5017

STEPANOV, V.L.

Early use of exercise in treating phlegmon of the extremities.
Vop. kur., fizioter. i lech. fiz. kul't. 26 no.5:445-447 S-O '61.
(MIRA 14:11)

(EXERCISE THERAPY) (PHLEGMON)

SILAYEV, A.B.;STEPANOV, V.M.

Role of the free amino group of gramicidin C in biological activity. Dokl. AN SSSR 112 no.2:297-299 Ja '57. (MLRA 10:4)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. Predstavleno akademikom A. N. Nesmeyanovym.
(Gramicidin)

STEPANOV, V.M., Cand Chem.Sci--(diss) "Synthesis and properties of the derivatives of gramicidine C." Moscow, 1958. 11pp, (Moscow State Univ im M.V.Lomonosov. Chemical Faculty). 130 copies. (KL, 38-58, 104).

6

STEPANOV, V.M.; SILAYEV, A.B.; POLIN, A.N.

Production and studies on antibiotic properties of S-M-peptides of gramicidin C. Antibiotiki 3 no.5:49-53 S-O '58. (MIRA 12:11)

1. Moskovskiy ordena Lenina gosudarstvennyy universitet imeni M.V.Lomonosova.

(ANTIBIOTICS,
gramicidin C, S-M-peptides (Rus))

KHOKHLOV, A.S.; SILAYEV, A.B.; STEPANOV, V.M.; YULIKOVA, Yo.P.; TROSHKO, Yo.V.; LEVIN, Ye.D.; MAMIOFE, S.M.; SINITSYNA, Z.T.; CHI CHAN-TSIN [Ch'ih Ch'ang-Ch'ing]; SOLOV'YEVA, N.K.; IL'INSKAYA, S.A.; ROSSOVSKAYA, V.S.; DMITRIYEVA, V.S.; SEMENOV, S.M.; VEYS, R.A.; BEREZINA, Ye.K.; RUBTSOVA, L.K.

A new type of polymyxin, polymyxin M. Antibiotiki 5 no.1:3-9 Ja-F '60. (MIRA 13:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut antibiotikov i laboratoriya khimii belka i antibiotikov khimicheskogo fakul'teta Moskovskogo ordena Lenina gosudarstvennogo universiteta imeni M.V. Lomonosova.

(POLYMIXIN)

STEPANOV, V.M.; SILAYEV, A.B.; KATRUKHA, G.S.

Molecular weight of polymyxin M. Biokhimiia 25 no.4:749-757 Jl-Ag '60. (MIRA 13:11)

1. Laboratory of Protein Chemistry and Antibiotics, Chemical Faculty, the State University, Moscow.
(POLYMYXINS)

KATRUKHA, G.S.; STEPANOV, V.M.; SILAYEV, A.B.

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